

CLAIMS:

1. A process for casting a metal artefact by charging a die or mould with molten metal and causing or allowing the metal to solidify in the die or mould to form the artefact, the process being characterized in that it includes the step, prior to charging the die or mould with the molten metal, of heating the die or mould by induction heating to an elevated temperature, the charging taking place with the die or mould at the elevated temperature.
2. A process as claimed in Claim 1, characterized in that it includes the step, prior to the charging of the die or mould, of purging the die or mould with a purging gas, the charging taking place under an atmosphere provided by the purging gas.
3. A process as claimed in Claim 2, characterized in that the purging is carried out both prior to and during the heating of the die or mould, the purging being discontinued before the charging takes place.
4. A process as claimed in any one of the preceding claims, characterized in that the charging is carried out under pressure, acting to fill the die or mould to its full capacity.
5. A process as claimed in Claim 4, characterized in that the charging is carried out by injection moulding, at an intermediate pressure in the range 50 KPa -30MPa.

6. A process as claimed in any one of the preceding claims, characterized in that it includes using, as the metal, a metal selected from the group consisting of aluminium, magnesium, lithium, zinc and alloys thereof.

5 7. A process as claimed in Claim 6, characterized in that it includes using, as the metal, a light metal selected from the group consisting of magnesium, aluminium and alloys thereof.

8. A process as claimed in any Claim 7, characterized in that the casting is of a
10 light metal artefact in the form of a motor vehicle wheel rim.

9. A process as claimed in any one of the preceding claims, characterized in that the casting is of a metal artefact in which all parts of the solidified artefact are spaced from the closest part of the surface of the artefact by a spacing of 0.75 – 15mm, the
15 artefact having a mass of 0.25 – 30 kg.

10. A process as claimed in any one of the preceding claims, characterized in that the induction heating is employed to provide the surface of the interior of the die or mould with a desired temperature profile whereby the interior surface of the die or
20 mould has different parts or zones at different temperatures from each other or one another, in contact with the molten metal charged into the die or mould, thereby to promote desired cooling and solidification rates in different parts of the metal charged into the die or mould.

11. A process as claimed in any one of the preceding claims, characterized in that charging the die or mould is from a melting apparatus having a capacity to produce a full charge of molten metal which is matched in volume with the capacity or volume or the die or mould, the charging of the die or mould being with sufficient molten
5 metal to produce a single artefact and the charging acting entirely to consume a full molten charge produced by the melting apparatus.

12. A process as claimed in any one of the preceding claims, characterized in that the charging of the die or mould is from a melting apparatus which is reciprocally
10 movable relative to the die or mould, the process including reciprocally moving the melting apparatus between a charging position where it is charged with a precursor of the molten charge, and a filling position where the molten charge is transferred from the melting apparatus to the casting assembly.

13. A process as claimed in any one of the preceding claims, characterized in that the casting is carried out in a plurality of dies or moulds, each associated with a single melting apparatus from which it is charged, each melting apparatus being associated with a single die or mould and being electrically heated by induction heating, a common electrical power supply being used to supply electrical power to
15 the dies or moulds for the induction heating thereof, and a common electrical power supply being used to supply electrical power to the melting apparatuses.

14. A casting assembly (10) for casting a metal artefact (100), the assembly including a die or mould (12) for casting the artefact and the assembly being characterized in that

it includes an induction heating arrangement (14), the induction heating arrangement including at least one induction coil (25, 26, 27, 28, 29, 30) surrounding the die or mould, for heating the die or mould to an elevated temperature prior to the casting of the artefact.

15. An assembly as claimed in Claim 14, characterized in that the induction heating arrangement is in the form of a variable-frequency induction heater (16).

16. An assembly as claimed in Claim 14 or Claim 15, which includes a purging gas supply line (31) connected to the die or mould for supplying a purging gas to the interior of the die or mould.

17. An assembly as claimed in any one of Claims 14 – 16 inclusive, characterized in that the die or mould is a re-usable multi-core segmented metal die or mould.

18. An assembly as claimed in Claim 17, characterized in that the re-usable die or mould is hydraulically operable and has a bottom- or face core provided with a metal-charging opening for charging the die or mould with molten metal from below.

19. An assembly as claimed in any one of Claims 14 – 18 inclusive, in which the induction heating arrangement includes a plurality of at least two induction coils

which are operable independently of each other or one another to heat the die or mould to said elevated temperature while providing the surface of the interior of the die or mould with a desired temperature profile.

5 20. A casting apparatus or installation for casting metal artefacts, the apparatus being characterized in that it includes a casting assembly (10) as claimed in Claim 14, and a melting apparatus (40) for forming a molten charge of metal for use in the casting of a metal artefact in the casting assembly, the melting apparatus including a heating arrangement (44) for heating a precursor of the molten charge to a
10 temperature at which the molten charge is formed from the precursor.

21. An apparatus or installation as claimed in Claim 20, characterized in that the melting apparatus has a capacity to produce a full charge of molten metal having a volume which is matched with the capacity or volume of the die or mould so that the
15 casting of a single artefact in the die or mould entirely consumes a full molten charge produced by the melting apparatus when the melting apparatus is operated at full capacity.

22. An apparatus or installation as claimed in Claim 20 or Claim 21, characterized
20 in that the heating arrangement of the melting apparatus is an induction heating arrangement comprising at least one induction coil (46).

23. An apparatus or installation as claimed in any one of Claims 20 – 22 inclusive, characterized in that the melting apparatus is reciprocally movable relative to the

casting assembly between a charging position where charging of the melting apparatus with a precursor of the molten charge takes place, and a filling position where transfer of a molten charge from the melting apparatus to the casting assembly takes place.

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24. An apparatus or installation as claimed in Claim 23, characterized in that it includes rails (67), the melting apparatus being mounted via wheels (66) on the rails, the wheels being rollable along the rails during reciprocating movement of the melting apparatus relative to the casting assembly.

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25. An apparatus or installation as claimed in any one of Claims 20 – 24 inclusive, characterized in that it includes a plurality of the casting assemblies and the same plurality of the melting apparatuses, each casting assembly being associated with a single said melting apparatus and each melting apparatus being associated with a
15 single said casting assembly, the casting assemblies sharing a common electrical heating power supply (94) and the melting apparatuses sharing a common electrical heating power supply (92).